School based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy

Matrix Insight, in collaboration with Imperial College London, Kings College London and Bazian Ltd, were commissioned by Health England to undertake a research study to develop and apply a method for prioritising investments in preventative interventions for *England*. Seventeen preventative health interventions were included in the study. Each intervention was evaluated in terms of the following criteria: reach; inequality score; cost-effectiveness; and affordability. This report presents the results of the analysis for one of the interventions: school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy. The full report of the study is available from the ***H.E.L.P.*** website.

Summary

Description of the intervention
School based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy. The intervention involved weekly lessons following a health curriculum that highlights the impacts of drug and alcohol use, violence and sexual behaviour on health. The curriculum was developed throughout with input from students, teachers and parents. Teaching staff were trained to deliver the program (O'Donnell et al, 1995).

Criteria	Measure	Value	Certainty
1. Reach			
Percentage of population affected by the condition and that could potentially benefit from the intervention.	Sexually active 11 to 16 year olds as a percentage of population aged 11 and above in England (NATSEL, 2000).	0.52%	★
2. Inequality score			
Ratio of the percentage of disadvantaged population to the percentage of the general population that could potentially benefit from the intervention.	Ratio of percentage having first sexual experience before 16 whose parents' socioeconomic status is manual to percentage having first sexual experience before 16 whose parents' socioeconomic status is manual or non-manual (Wellings et al, 2000 using data from NATSEL, 2000).	1.57	★
3. Cost-effectiveness			
Cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£5,970	★★
Net cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£4,965	★★
Timing of benefits	QALY gain and cost savings are estimated to occur 5 or more years after the intervention.		
4. Affordability			
Total cost of implementing the intervention at the national level	Multiple of eligible individuals and unit cost of the intervention	Between £100 million and £1 billion	★

Key to certainty grading scales

★ Low quality evidence
★★ Medium quality evidence
★★★ High quality evidence

Box 1. Cost per QALY gained

A quality adjusted life year (QALY) is a simple way of combining quality of life with length of life.
One QALY is equivalent to one year in full health. The cost per QALY gained is therefore the cost of achieving one extra year of full health. Its calculation is based on the following formula:

$$cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention}{QALYs\ gained}$$

The net cost per QALY gained is the cost per QALY considering the incremental cost of the intervention as well as the cost saved through health treatment avoided. Its calculation is based on the following formula:

$$net\ cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention - cost\ savings}{QALYs\ gained}$$

Cost effectiveness

Cost. School based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy cost £157.15 per person (£2007/08).

Effect. School based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy results in an increase in condom use in sexually active 14 year old pupils of 9.36 per cent compared to no intervention (24.10% of the cohort that had received the intervention had recently had sex without a condom whereas 33.46% of those that had not received the intervention had recently had unsafe sex without a condom). This effect was obtained from a review undertaken to identify evidence on the effectiveness and cost-effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy.

Benefits. The benefits of the intervention are gained when individuals use a condom during sexual intercourse. Two types of benefits are considered: QALYs and health care cost savings. Based on the QALYs gained and the health care cost savings of condom use, a 9.36 per cent increase in the use is associated with the following benefits:

- An additional 0.156 QALYs per sexually active 11-16 year old receiving the intervention
- Cost savings of £934 per sexually active 11-16 year old receiving the intervention (£2007/08)

Please refer to decision model for details on how the QALY gain and cost savings were calculated.

Decision model

A decision model was built to estimate the cost-effectiveness of the intervention. The model estimates the QALY gain and cost savings associated with the intervention.

Unless stated otherwise, the analysis was undertaken in accordance with H.M. Treasury's Green Book (HM Treasury 2003). Specifically,

- Any costs and effects incurred more than one year after the intervention were discounted at 3.5%.
- Where necessary monetary values were converted in 2007/8 prices using Gross Domestic Product (GDP) deflators, HM Treasury (2008).
- Where necessary monetary values were converted into pounds sterling using http://www.x-rates.com.

The decision model assumes that not practicing safe sex, (i.e. not using a condom) results in three possible avoided outcomes, which occur independent of one and other:

- Chlamydia
- Teenage pregnancy
- HIV

The model draws the following estimates from the literature:

- The unit cost of the intervention (Table 1)
- The effect of the intervention on whether individuals use a condom (Table 1)
- The probabilities that those who do not use a condom experience adverse health outcomes (Table 2, Table 4 and Table 6)
- The impact of experiencing adverse health outcomes on health care treatment costs (Table 3, Table 5 and Table 7)
- The impact of experiencing adverse health outcomes on quality of life, measured in QALYs (Table 3, Table 5 and Table 7).

Table 1. Intervention costs and effects

Description	Value	Assumptions and sources
Intervention received: sex education program in schools	£157.15	All teacher and trainer time was costed at average DCSF (2007) teacher salary rates, assuming a 37 hour working week. Class size was assumed to be 30 pupils per class (O'Donnell et al, 1995).
Intervention outcome: engage in safe sex or unsafe sex	9.36% decrease in unsafe sex	The intervention effect was a decrease in the practice of recent sex without a condom of 9.36%. 24.10% of the cohort that had received the intervention had recently had sex without a condom. 33.46% of those that had not received the intervention had recently had sex without a condom (O'Donnell et al, 1995).
Probability of engaging in safe or unsafe sex in the general population	0.337	This calculation assumes that the definition of safe sex is the use of a male condom during sexual intercourse, that men that engage in sex with men (MSM) do not engage in heterosexual intercourse and that MSM that report 'sometimes' using a condom during intercourse use a condom 25% of the time (Mercer et al, 2009; Mercer et al, 2004; Sigma Research, 2005).

Timing of benefits

The effect study measured the prevalence of condom use in 14 year olds six months after the intervention in the control and intervention groups. Both groups had a different condom use prevalence after six months than at baseline. Condom use prevalence was also higher than in the general adult population in both groups.

The effect of the intervention was measured at six months. No further follow-ups were reported in the effect study. Longer term effects were not studied. Possible longer term outcome scenarios include:

1. The outcome could last for 6 months only and then fall to the general adult population prevalence.
2. The outcome could last for the rest of the lives of the intervention group.
3. The outcome could last for a limited period with the difference between the intervention and none intervention groups decreasing over a defined period of time (Figure 1).

Option 3 (above) was adopted in the model. The defined period of time was assumed to be 7 years from the intervention (to age 21) and the rate at which the effect of the intervention decreased was assumed to be linear over the 6.5 years after follow-up (Figure 1).

The annual rate of decrease of the intervention effect was calculated using the following formula:

$$1 - [(\text{general population condom use prevalence} / \text{study group condom use prevalence})^{(1/t)}]$$

Where t = the number of years following the intervention.

The intervention effect was then calculated for each year following the intervention from 0 to 7. The cost savings and QALY gains for all seven years were aggregated to give total cost savings and QALY gains over the assumed lifespan of the intervention effect.

Figure 1. Timing of benefits

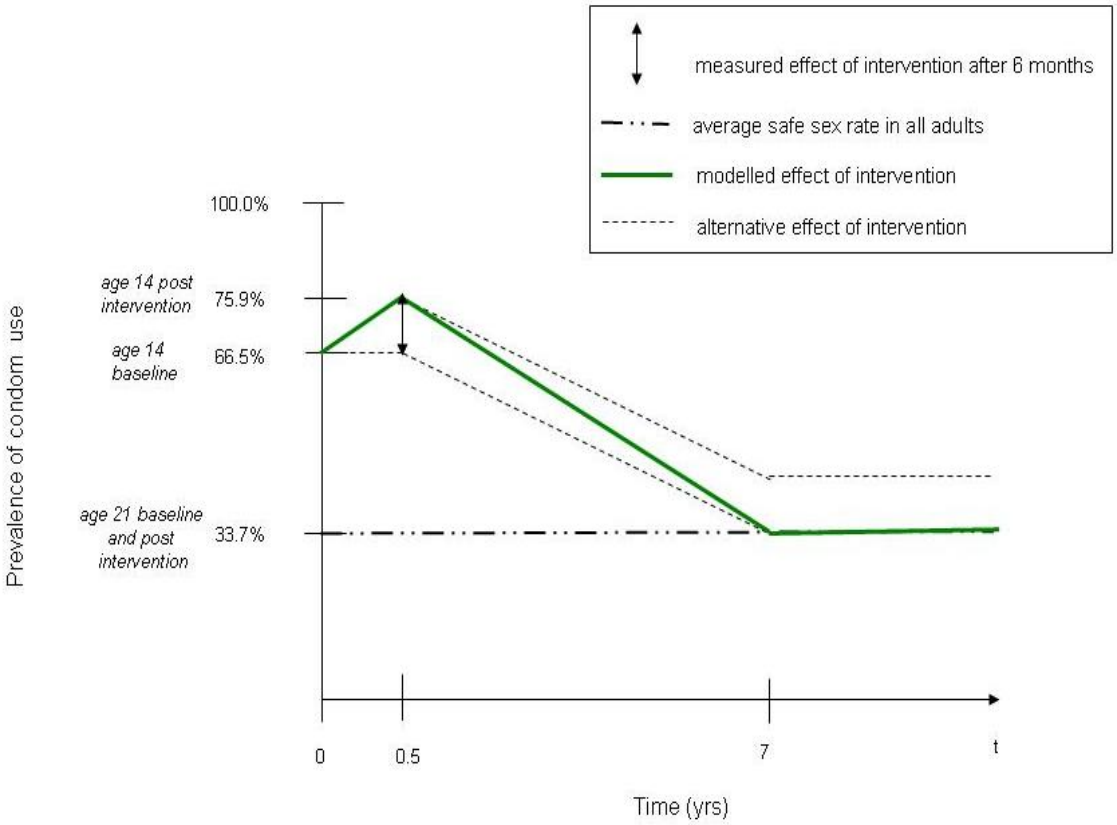

Figure 2. Avoided cases of *Chlamydia* model

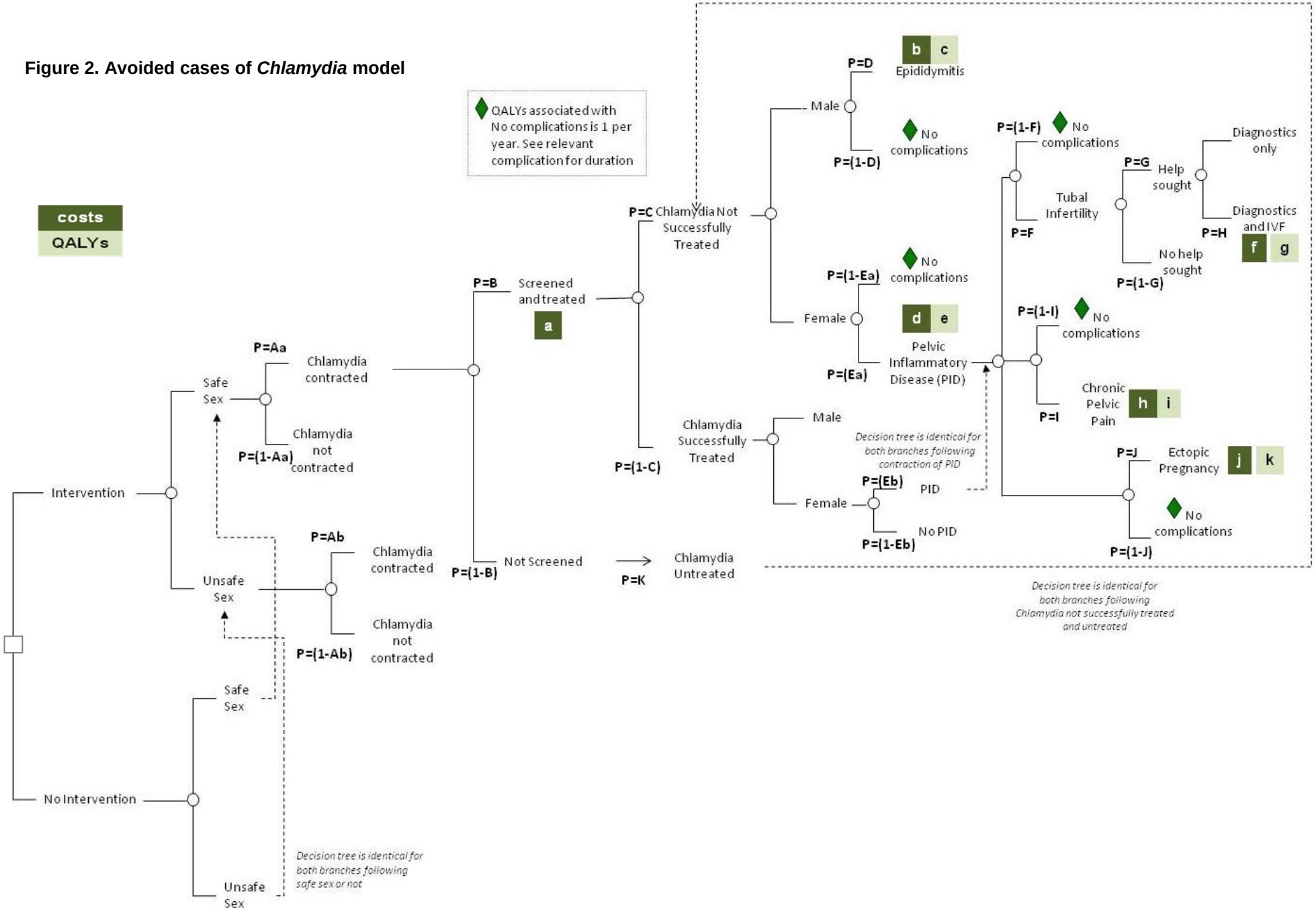

Table 2. Transition probabilities associated with Chlamydia

Diagram reference	Description	Value	Assumptions and sources
Aa	Contract Chlamydia if safe sex	0.003255	Chance of contracting Chlamydia = P(if sex, partner infected) x P(transmission) x P(condom fails). Chance of having sexual intercourse with Chlamydia infected individual is reported prevalence of Chlamydia (Low et al, 2002) plus unreported prevalence of Chlamydia (Turner et al, 2007). Transmission rate from Katz et al (1990). Condom failure rate from: http://www.ffprhc.org.uk/admin/uploads/449_EmergencyContraceptionCEUguidance.pdf Assumes that the % of the population with untreated asymptomatic Chlamydia is the same in the UK as US in Turner et al (2007). Also assumes that the probability of transmission of Chlamydia and condom failure is the same for MSM sexual intercourse as heterosexual intercourse.
Ab	Contract Chlamydia if unsafe sex	0.0217	Chance of contracting Chlamydia = P(if sex, partner infected) x P(transmission). Chance of having sexual intercourse with Chlamydia infected individual is reported prevalence of Chlamydia (Low et al, 2002) plus unreported prevalence of Chlamydia (Turner et al, 2007). Transmission rate from Katz et al (1990). Assumes that the % of the population with untreated asymptomatic Chlamydia is the same in the UK as US in Turner et al (2007). Also assumes that the probability of transmission of Chlamydia is the same for MSM sexual intercourse as heterosexual intercourse.
B	Chlamydia screened and treated	0.52	Chance of been screened and treated if Chlamydia contracted = [reported prevalence / (reported + unreported prevalence]. Reported prevalence (Low et al, 2002), Unreported prevalence (Turner et al, 2007). Assumes that the % of the population with untreated asymptomatic Chlamydia is the same in the UK as US in Turner et al (2007).
C	Chlamydia not successfully treated	0.05	Cure rate from Norman et al (2006). Assuming 100% compliance with treatment.
D	Primary complications following Chlamydia infection in men.	0.03	Rates from Chesson et al (2008). Assumes that the only complication a male with Chlamydia can develop is Epididymitis and that following treatment of Chlamydia the probability of this complication attributable to Chlamydia is 0 (Chesson et al, 2008).
Ea	Primary complications following Chlamydia infection in women.	0.2	Rates from Chesson et al (2008). Assumes that the only primary complication a female with Chlamydia can develop is pelvic inflammatory disease (PID).
Eb	PID following successful treatment of Chlamydia in women.	0.04	Chesson et al (2008).

Diagram reference	Description	Value	Assumptions and sources
F	Development of tubal infertility following PID	0.2	Rates from Hu et al (2004).
G	The probability of infertile couple seeking diagnosis of infertility is	0.835	Assume 100% of couples that seek medical help for infertility have diagnostic tests.
H	Treatment for tubal infertility	1.0	It is assumes that 100% of couples that seek medical help for infertility and have diagnostic tests have fertility treatment.
I	Development and treatment of chronic pelvic pain following PID	0.18	Rates from Hu et al (2004).
J	Development of ectopic pregnancy following PID	0.09	Rates from Hu et al (2004).
K	Probability of Chlamydia not being treated without screening	1.0	Norman et al (2004).

Table 3. Associated outcomes (monetary values in £2007/08) associated with Chlamydia

Diagram reference	Description	Value	Assumptions and sources
a	Chlamydia treatment	£10.97	Cost of treatment: http://cks.library.nhs.uk/chlamydia_uncomplicated_genital
b	The cost of treating Epididymitis	£10.97.	Cost of treatment: http://cks.library.nhs.uk/chlamydia_uncomplicated_genital. Assume that 100% of cases are treated.
c	QALYs associated with Epididymitis	0.009	7 day duration. QALYs calculated using HUI utility weights and durations from Stratton et al (2000).
d	The cost of treating PID	£9.11	Rates from Chesson et al (2008). Assumes that the only primary complication a female with Chlamydia can develop is pelvic inflammatory disease (PID) and that following treatment of Chlamydia the probability of PID attributable to Chlamydia is 0.04 of females with Chlamydia (Chesson et al, 2008). Cost of treatment http://www.cks.nhs.uk/pelvic_inflammatory_disease Assumes that 100% of cases are treated.
e	The QALYs associated with PID	0.01726	10 day duration. QALYs calculated using HUI utility weights and durations from Stratton et al (2000).
f	Cost of treatment for tubal infertility	£4,606	It is assumes that 100% of couples that have tubal infertility seek medical help for infertility and have diagnostic tests have

Diagram reference	Description	Value	Assumptions and sources
			fertility treatment. Fertility treatment costs from NICE CG11 Infertility costing template. Assume an average of 2 NHS funded cycles per couple. Uses weighted average cost of different types of treatment.
g	The QALYs associated with tubal infertility	12.3	15 year duration. QALYs calculated using HUI utility weights and durations from Stratton et al (2000).
h	Treatment costs of chronic pelvic pain	£370	Rates from Hu et al (2004). Cost of treatment http://www.cks.nhs.uk/pelvic_inflammatory_disease
i	QALYs associated with chronic pelvic pain	6.0	Duration is 10 years. QALYs calculated using HUI utility weights and durations from Stratton et al (2000).
j	Treatment costs of ectopic pregnancy	£418	NHS National Tariff 2008 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081096
k	QALYs associated with ectopic pregnancy	0.09	Duration is 31 days. QALYs for ectopic pregnancy were calculated as an average of in and outpatients – 0.053 and 0.059 respectively. QALYs calculated using HUI utility weights and durations from Stratton et al (2000).

Figure 3. Avoided cases of teenage pregnancy model

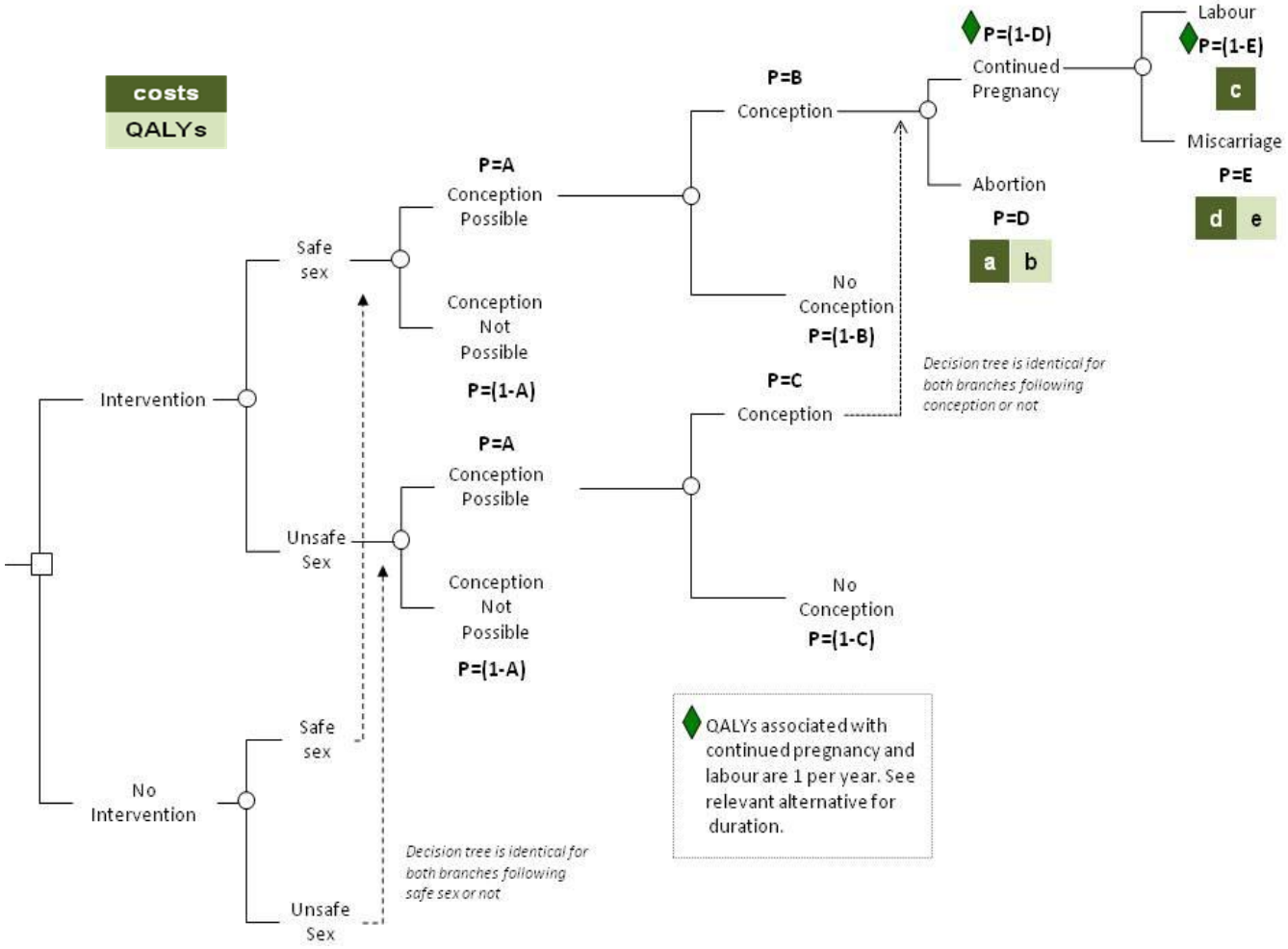

Table 4. Transition probabilities associated with teenage pregnancy

Diagram reference	Description	Value	Assumptions and sources
A	Probability of a woman being fertile per day	0.21	This assume that the number of days per month a woman is fertile (fertile window) = 6 and that the number of days per menstrual cycle = 28 (Wilcox et al, 2000). It was also assumed that all men are in the model are fertile every day.
B	Probability of conception if safe sex	0.056	This is dependent on condom failure (P=0.15) (http://www.ffprhc.org.uk/admin/uploads/449_EmergencyContraceptionCEUguidance.pdf) and not using another form of contraception (P(female aged 16-19 using another form of contraception) = 0.37). Omnibus Survey Report No. 37 Contraception and Sexual Health 2007/08. This assumes that the 'withdrawal' method does not prevent

Diagram reference	Description	Value	Assumptions and sources
			pregnancy if a woman is in the fertile window, conception is possible and that conception always occurs if condom fails and woman is not using another form of contraception.
C	Probability of conception if unsafe sex	0.37	Omnibus Survey Report No. 37 Contraception and Sexual Health 2007/08 This also assumes that the 'withdrawal' method does not prevent pregnancy, that if a woman is in the fertile window, conception is possible and that conception always occurs if condom fails and woman is not using another form of contraception.
D	Probability of abortion if conception occurs	0.49	P(given aged 15-17 and pregnant, have abortion) (http://www.everychildmatters.gov.uk/resources-and-practice/IG00200/).
E	Probability of miscarriage if pregnancy continues	0.133	P(given aged 15-17, pregnant and no abortion, miscarriage) (Nybo Andersen et al, 2000).

Notes

- The model assumes that all teenage pregnancies are unwanted and classed as an averted outcome, which assumes none are planned.

Table 5. Associated outcomes (monetary values in £2007/08) associated with teenage pregnancy

Diagram reference	Description	Value	Assumptions and sources
a	Average cost of abortion	£500.40	Average cost of abortion calculated assumes that all of the 60% of abortions that occur before 10 weeks gestation are medical and all of the 40% performed after 10 weeks gestation are surgical using costs from 2008/09 NHS tariff. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_4116461 and NHS Tariff 2008/09.
b	QALYs associated with abortion	0.37	Duration is 6 months. QALYs associated with abortion are calculated based on the mental health outcomes for teenagers that have abortions reported in Fergusson, Horwood and Ridder (2006).
c	Costs of antenatal care and labour miscarriage	£109.61 and £1485 respectively	Costs of antenatal care are included for live births only. The values are adapted from NICE costing template CG62. Includes screening for foetal abnormalities, Down's syndrome, gestational diabetes and treatment for gestational diabetes. Assumes total number of pregnancies per year is 609,300, which is consistent with the NICE costing template. http://www.nice.org.uk/CG62. Average cost of labour is a weighted average of the cost of vaginal birth £749 (79.1%) and caesarean £2701 (20.1%) http://www.parliament.uk/post/pn184.pdf.

Diagram reference	Description	Value	Assumptions and sources
d	Costs of miscarriage	£469	National Tariff 2008/09 'Threatened or Spontaneous Abortion'
e	QALYs associated with miscarriage	0.46	Duration is 6 months

Figure 4. Avoided cases of HIV model

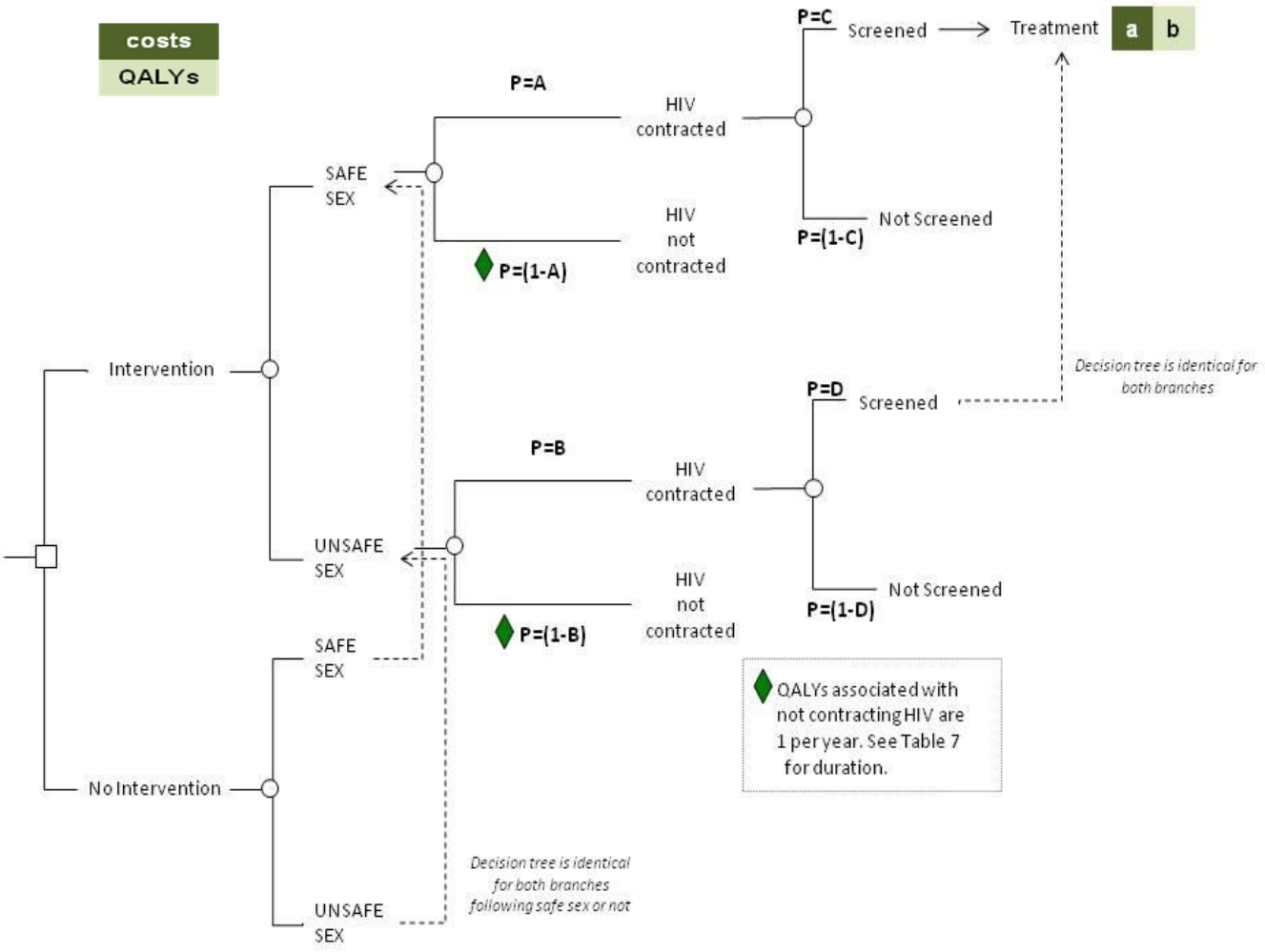

Table 6. Transition probabilities associated with HIV

Diagram reference	Description	Value	Assumptions and sources
A	Probability of contracting HIV if unsafe sex	0.000484	Dependent on the probability of having sex with an infected individual. HIV prevalence rates are different in heterosexual (0.000128) and MSM populations (0.00648). Combined with the probability of sex being heterosexual (0.944). References: Mercer et al (2004), HPA (2008) and ONS (2009).
B	Probability of contracting HIV if safe sex	0.0000629	(Probability of condom failing is 0.13 * Probability of contracting HIV is 0.000484) Reference: Sigma Research (2005)
C	Probability of HIV screening if unsafe sex	0.681	0.702 in MSM and 0.68 in heterosexuals Munro et al (2008) and Stanley et al (2003).
D	Probability of HIV screening if safe sex is	0.170	Assume rate is one quarter of unsafe sex screening rate

Table 7. Associated outcomes (monetary values in £2007/08) associated with HIV

Diagram reference	Description	Value	Assumptions and sources
a	Costs associated with treating HIV	£151,434.06	Assume that 100% of people with HIV that are screened receive treatment. Costs: £16,000 per annum for 20 years, discounted to 2007/08. Mandilia S et al *(*2006).
b	QALYs associated with HIV infection then AIDs then death prematurely	25	Assuming that QALYs lost are 20 years with HIV, 2 years with AIDS and death 23 years prematurely. Total QALYs without HIV = 45. http://www.dwp.gov.uk/medical/med_conditions/hiv-aids/prognosis_hiv_aids.asp Reference: Holtgrave and Pinkerton (1997).

Notes

- Screening and treatment was assumed to occur 1 years after contracting HIV, with HIV treatment assumed to start 1 year after infection and last for 20 years http://www.dwp.gov.uk/medical/med_conditions/hiv-aids/prognosis_hiv_aids.asp
- Model assumes that frequency of sex in aged 14-21 year olds is 42.3 times per annum (Laumann, Gagnon, Michael, Michaels, 1994).

Effectiveness evidence

A literature review was undertaken by Bazian to identify evidence on the effectiveness and cost-effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy. Further details are available on the evidence methods page of the ***H.E.L.P.*** website.

The review of the evidence on the effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy identified a number of studies. Table 8 provides the following details of the studies identified:

- Population
- Intervention
- Results

The review of the evidence on the cost-effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy identified a number of studies. Table 9 provides the following details of the studies identified:

- Population, intervention and model
- Perspective, discounting, inflation, cost year
- Utility/benefit
- Unit costs
- Efficiency

Table 10 and Table 11 provide a quality assessment of the effectiveness and cost-effectiveness studies. Further details are available on the quality appraisal methods page.

The following criteria were applied to select effectiveness evidence for undertaking the economic analysis:

- Location. Studies from the UK were preferred over studies from other locations.
- Population. Studies applied to the general population were preferred over studies applied to restricted population groups (e.g. pregnant women; individuals from specific communities/nationalities).
- Counterfactual. Studies for which the counterfactual intervention was ‘usual care’ or ‘do nothing’ in a UK setting were preferred over studies for which the counterfactual was different from ‘usual care’ or ‘do nothing’.
- Method. Studies using more rigorous design methods (e.g. randomised control trials or quasi experimental designs with regression models controlling for confounders) were preferred over studies using less rigorous design methods (e.g. before-after studies or simple correlation analysis).

Table 8. Effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy.

Study reference	Population	Intervention	Results
Coyle et al, 1999 ▪ randomised controlled trial ▪ Wang et al, 2000[76] use this effectiveness data in their modelling	Effectiveness data from the cost-effectiveness publication are extracted here. Full text of RCT not retrieved. Young people attending 10 schools in northern California and 10 schools in southeast Texas. 3,677 ninth grade students who completed baseline and first follow up (i.e. 7 months): 47.5% male, 31% White, 27% Hispanic, 18% Asian or Pacific Islander, 17% African American.	*Intervention:* ▪ Safer Choices: school-based education programme designed to prevent HIV, STDs and pregnancies among high school students. 2-year, theory-based, multicomponent intervention, an evaluation of which was implemented during 1993 to 1994 / 1994 to 1995 year. Primary aim was to reduce number of students engaging in unprotected sexual intercourse by reducing number of sexually active high school students and by increasing condom and contraceptive use among those students who have sex *Control* ▪ Standard information-based HIV prevention curriculum	Percentage reporting condom use at last intercourse: 67% with intervention vs. 52% with control Percentage reporting contraception use at last intercourse: 68% with intervention vs. 57% with control Modelling also determined the following: 0.12 cases HIV averted; 24.37 cases of Chlamydia; 2.77 cases of gonorrhoea; 5.86 cases of pelvic inflammatory disease; 18.5 pregnancies averted

Study reference	Population	Intervention	Results
O'Donnell et al, 1999; USA ▪ randomised controlled trial	1,061 students in grades 7 and 8 (47.2% male, 15.9% Hispanic, 79.2% Black, 4.9% other).	*Intervention* ▪ Two intervention arms: Reach for Health curriculum only (RHC) and Reach for Health Curriculum plus the Community Youth Service (CYS) programme. Reach for Health curriculum focuses on 3 primary health risks faced by inner-city adolescents – drug and alcohol use, violence, and sexual behaviours that can result in HIV infection, STIs and pregnancy. CYS component involved 3 hours a week spent in a community placement (nursing homes, health clinic, child day care centres and senior citizen centre) *Control* ▪ No intervention	At follow-up, CYS participants reported less sexual activity ($p<0.05$) and had lower sexual activity scores ($p<0.03$) than controls. This effect was greatest in the eighth grade students (who received the most intensive service programme).

Study reference	Population	Intervention	Results
Kirby et al, 1991; USA ▪ quasi-randomised study	1,033 students in grades 9 to 12 (mean age 15.3 years, 47% male, 62% White, 20% Latino, 2% African American, 16% other.	*Intervention* ▪ Reducing the Risk intervention: curriculum approach based on social learning theory, social inoculation theory and cognitive behaviour theory. Teacher and classroom peers model socially desirable behaviour around successfully avoiding unprotected intercourse. These are practiced by students through role-playing. Curriculum lasts at least 15 class periods. *Control* ▪ Standard sexuality curriculum	There were significant differences between intervention and control group at 18 months including in: ▪ Contraceptive knowledge : 18% with intervention v 11 % with control, p<0.05 ▪ Initiating intercourse: 29% with intervention v 38% with control, p<0.05 ▪ Low risk youth (regardless of sexual experience at baseline) in numbers having unprotected intercourse: 13% with treatment v 23% with control, p<0.05 ▪ Numbers of sexually inexperienced youth engaging in unprotected intercourse: 9 % with treatment v 16% with control, p<0.05

Study reference	Population	Intervention	Results
Smith, 1994; USA ▪ randomised controlled trial	120 participants in 9th grade (mean age 15.1 years, 25.8% male, 43.3% Black, 30.8% West Indian, 22.5% Hispanic, 3.3%) in an inner city high school in Queens, New York.	Teen Incentives Program vs. control group receiving written materials about contraception and decision-making related to risk-taking behaviour. Teen Incentive Model used a Schinke's interpersonal skills training in Phase I (including family planning services). Experimental group met once weekly for eight weeks in small groups of 10 to 20 each. Objectives were to learning about self-esteem and assertiveness, communication, social interaction, confidence and decision-making, academic performance and career planning, parent/adolescent relationships, substance abuse/peer and community influences, sexuality including pregnancy and STIs. In phase II there was a career mentorship component.	Treatment had a significant effect on sexual frequency; $p<0.05$
Allen, 1997; USA ▪ randomised controlled trial	695 students in grades 9 to 12 (mean age 15.8 years, 15% male, 68.2% Black, 15.5% White, 11.2% Hispanic, 2.9% other)	Teen Outreach Project vs. control group receiving regular curricular offerings in health or social studies	% students pregnant after intervention: 4.2% with intervention vs. 9.8% with control; $p<0.05$ between groups at exit after accounting for differences at entry and sociodemographic characteristics

Study reference	Population	Intervention	Results
Walter & Vaughan, 1993; USA ▪ randomised controlled trial	Ninth and 11th grade students in two pairs of schools (demographically similar); mean age 15.7 years, 41.5% male, 72.1% black or Hispanic selected at random (30%) from schools. 739 in intervention group and 577 in control group.	*Intervention* ▪ Special AIDS prevention curriculum developed by the schools, the New York City Board of Education and the research team containing both theoretically and empirically based. Six one-class period lessons on consecutive days focussing on facts about AIDS transmission and prevention, teaching skills to appraise risk and respond to the level of risk, directing students to appropriate AIDS prevention resources in the school and the local community. Misperceptions were addressed in the middle two lessons and the final two focused on empowerment through role play and taught negotiation skills in the context of condom use and knowledge *Control* ▪ No formal AIDS curriculum	▪ Difference between intervention and control group in change in knowledge: 7.5 points, p<0.0001 ▪ Difference between intervention and control group in change in self-efficacy: 0.10 points, p=0.03 ▪ Difference between intervention and control group in change in behaviour risk index: -0.48, p=0.006 ▪ Difference between intervention and control group in beliefs: – Susceptibility: -0.15, p=0.14 – Benefits: 0.19, p=0.0001 – Barriers: 0.09, p=0.22 – Values: 0.09, p=0.5 – Norms: 0.12, p=0.003

Study reference	Population	Intervention	Results
Weeks et al, 1995; USA ▪ randomised controlled trial	2,318 students from 15 school districts in the Midwest.	*Intervention* ▪ Youth AIDS Prevention Project which involved two active intervention groups; parent-interactive or non-parent interactive vs. basic AIDS education ordinarily provided by school. Intervention was a school-based, multiple-risk reduction programme that aims to prevent STIs, HIV/AIDS and substance use in young people *Control* ▪ No intervention	Significance differences from baseline for both treatment and control groups in: ▪ Change in frequency of always using condoms between time1 and time2 (+6.7% with intervention vs. +6.0 with control) ▪ Change in frequency of ever used a condom/foam between time1 and time2 (3% with intervention vs. 5% with control) ▪ Change in frequency of intention to use a condom/foam next 12 months between time 1 and time 2 (5.5% with intervention vs. 0.2% with control) ▪ Change in frequency of intention to use condom next 12 months between time 1 and time 2 (12.9% with intervention vs. 12.8% with control) No between group comparisons but researchers state that changes in intervention group were larger than in control group

Study reference	Population	Intervention	Results
Boyer et al, 1997; USA ▪ quasi-randomised study	513 students attending four urban public high schools (59% female, mean age 14.4 years). Students were primarily 9th grade.	*Intervention* ▪ Didactic knowledge and skill-building sessions which took place over three consecutive days (three classes); provided essential knowledge for making healthy personal decisions concerning risk and prevention of STIs and HIV (e.g. asking students to give examples of what might happen when a person has unprotected sex prompting discussion of prevention and treatment); included a presentation demonstrating the progressive nature of sexual transmission. Skills-building involved games, simulated vignettes and role-play in class and small groups to develop problem-solving and communication skills *Control* ▪ One class period of didactic education comparable to that given in the intervention	Intervention had significant but small effect on: STI knowledge: regression coefficient = 0.8, $p<0.05$ sexual risk prevention skills: regression coefficient = 0.11, $p<0.05$ substance use prevention skills: regression coefficient=0.16, $p<0.001$ No significant impact of intervention on condom use, number of sexual partners, condom use in the previous month and alcohol and drug use

Study reference	Population	Intervention	Results
Kirby et al, 1997; USA ▪ randomised controlled trial	1,616 7th grade students (mean age 12.3 years, 46% male, 64% Latino, 13% Asian, 9% African American, 5% White) from seventh grade classes in six middle schools in Hollywood-Wilshire and Central areas of LA.	*Intervention* ▪ SNAPP program vs. didactic instruction about prevention of HIV, STD and pregnancy. Other objectives included increasing students' knowledge about pregnancy and HIV risk, protective behaviours, legal rights to health care and community resources. Also aimed to increase communication and negotiation skills regarding sexual activity and to increase their self-efficacy regarding those skills. Incorporated principles of social learning theory and health belief model. Eight sessions delivered over a two-week period *Control* ▪ No intervention	▪ Average number of correct knowledge items increase in intervention group at 5 months but not 17 months ▪ No difference between the groups in numbers who initiated sexual intercourse at 5 or 17 months ▪ No difference in change in percentage who tried to get someone to have sex at 5 or 17 months

Table 9. Cost-effectiveness of school based group education for increasing rates of condom use and reducing STIs and unwanted pregnancy

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
Wang et al, 2000	Safer Choices (2-year, theory-based, multicomponent intervention, an evaluation of which was implemented during 1993-1994 / 1994-1995 year) aiming to reduce number of students engaging in unprotected sexual intercourse by reducing number of sexually active high school students and by increasing condom and contraceptive use among those students who have sex vs. standard, information based, HIV prevention curriculum. Described as 'simple, 1-year cumulative probability to estimate number of HIV and STD infections averted. Also included an adaptation of the 'Bernoulli model' (a cumulative probability equation that estimates probability of HIV based on number of sexual partners, number of sexual contacts with each, HIV prevalence, and probability of transmission) to translate increases in condom use into cases of HIV and STDs averted. Researchers developed a pregnancy model to translate increases in contraceptive use into cases of pregnancy averted.	▪ Social perspective ▪ Unclear whether adjusted for inflation ▪ 5% discount rate ▪ Cost year: USD1994	0.12 cases HIV averted; 24.37 cases of chlamydia; 2.77 cases of gonorrhoea; 5.86 cases of pelvic inflammatory disease; 18.5 pregnancies averted.	Total cost of Safer Choices program: $105,243 ($102,852 for program + $2391 for condoms and oral contraceptives)	$174,276 Benefit:cost ratio 2.65:1

Table 10. Quality assessment for effectiveness studies

Study reference	QA for trials/RCTs					Score	Grading (++ 4-5; + 3; -0-2)
	Follow-up	Intention to treat?	Attrition	Groups similar or controlled?	Randomised?		
Coyle et al, 1999	Yes	No	Yes	Don't know	Yes	3	+
O'Donnell et al, 1999	Yes	Don't know	Yes	Yes	Yes	3	+
Kirby et al, 1991	Yes	Don't know	No	Yes	No	2	+
Smith, 1994	Yes	Don't know	Yes	Yes	Yes	4	++
Allen, 1997	Yes	Don't know	Yes	Yes	Yes	4	++
Walter & Vaughan, 1993	No	No	No	Yes	Yes	2	-
Weeks et al, 1995	Yes	No	Yes	Yes	Yes	4	++
Boyer et al, 1997	No	Don't know	No	Yes	No	1	-
Kirby et al, 1997	Yes	Don't know	Yes	Don't know	Yes	3	+

Table 11. Quality assessment for economic studies

Study reference	QA for economic studies						Score	Grading (++ 4-6; + 3; -0-2)
	All costs of intervention included?	Market values used for costs?	Perspective reported?	Sensitivity analysis?	Reports base year adopted?	Effectiveness data from RCT or MA?		
Wang et al, 2000	Don't know	No	Yes	Yes	Yes	Yes	4	++

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